

**FORCIPOMYIA (MICROHELEA) TETTIGONARIS
(DIPTERA: CERATOPOGONIDAE) PARASITIZING
KATYDIDS (ORTHOPTERA: TETTIGONIIDAE) IN THE
DOMINICAN REPUBLIC¹**

Daniel E. Perez-Gelabert,² William L. Grogan, Jr.³

ABSTRACT: The ectoparasitic ceratopogonid midge, *Forcipomyia* (*Microhelea*) *tettigonar*is was observed feeding on katydids of the genera *Polyancistrus* and *Spelaesala* (Pseudophyllinae) in two montane areas of the Dominican Republic. Previously known only from Peru and Costa Rica, these new records from Hispaniola considerably extend the known distribution of this species in the Neotropics.

"Stick-ticks" belonging to the subgenus *Microhelea* Kieffer of the genus *Forcipomyia* Meigen, are ectoparasitic biting midges (Diptera: Ceratopogonidae). As in other ectoparasitic ceratopogonids, adult females penetrate the exoskeleton of their host and suck out hemolymph, which causes their abdomens to swell in a tick-like manner as they feed. Their abdomens may remain in a swollen state during subsequent egg development (Wirth 1971). Wirth (1991) recognized two groups of stick-ticks distinguished by their general morphology and biting apparatus: (1) the *fuliginosa* group, which feed on larvae of Lepidoptera, have a subcylindrical proboscis and an abdomen that never becomes broader than the thorax when engorged; and (2) the *ixodoides* group, which are ectoparasites of walkingsticks and katydids, but have a proboscis that is expanded at the tip, and their abdomen often swells to several times the size of the thorax when engorged.

Members of the *ixodoides* group were originally known only to parasitize phasmatids. They were first reported to feed on katydids from Australia (Debenham 1987), and more recently on Neotropical katydids (Wirth and Castner 1990; Clastrier and Wirth 1995). *Forcipomyia* (*Microhelea*) *tettigonar*is Wirth and Castner (1990), was described from two females that were found attached to the scutellum of the pseudophylline katydid, *Roxelana crassicornis* (Stål), from Iquitos, Peru, and another female that was attached to an unidentified pseudophylline katydid from La Selva, Costa Rica. In their recent revision of *Microhelea*, Clastrier and Wirth (1995) reported an additional female of *F. tettigonar*is taken from a phasmatid in Peru, and designated the paratype of *F. tettigonar*is from a katydid from Iquitos, Peru, as the holotype (and only known specimen) of their new species, *F. (M.) brasiliana*.

¹ Received August 10 1998, Accepted June 25, 1999.

² 414 N. Summit Ave. #001, Gaithersburg, MD 20877.

³ Department of Biological Sciences, Salisbury State University, Salisbury, MD 21801.

We report *F. (M.) tettigonoris* parasitizing two individual katydids belonging to the endemic Hispaniolan genera *Polyancistrus* and *Spelaeala*, from the northwestern and central sections of the Cordillera Central in the Dominican Republic, respectively. The *Polyancistrus* katydid was parasitized by 6 greatly swollen females and one unengorged specimen, that were attached in a tight group on the dorso-anterior portion of the katydid's abdomen, and some were under the developing tegminae. The second katydid, *Spelaeala bondi* Rehn (1943), had a single unengorged female attached to its abdominal tergum. These Hispaniolan records considerably extend the known range of *F. tettigonoris*, and suggest an even greater distribution for this ectoparasitic midge in the Neotropics.

***Forcipomyia (Microhelea) tettigonoris* Wirth and Castner**

Forcipomyia (Microhelea) tettigonoris Wirth and Castner, 1990: 159 (female; Peru; figs. of flagellum, palpus, mandible, maxilla, spermathecae); Wirth, 1991: 126 (in key; diagnosis; distribution; figs. of palpus, mandible, maxilla); Clastrier and Wirth, 1995: 109 (female; figs. of mouth parts; mandible, maxilla, palpus).

Recognition. The 8 specimens from the Dominican Republic key to *F. (M.) tettigonoris* in the most recent key by Clastrier and Wirth (1995), and generally agree with the combination of characters and illustrations presented by Wirth and Castner (1990), and Clastrier and Wirth (1995) as follows: antennae and palpi not bicolored; legs entirely yellowish; mandible with low number of teeth (15); maxilla with highly pigmented transverse corrugations; and abdomen without dark striated scales, but with a sparse vestiture of fine brownish setae. Our initial examination with a dissecting microscope at 6-50X, was followed by a detailed study of the two unengorged individuals, which were cleared in phenol-alcohol and mounted in phenol-balsam on microscope slides in the manner of Wirth and Marston (1968) for observation at 40-400X with a compound microscope. We consider both of these slide-mounted females to be conspecific with the holotype of *F. tettigonoris* as features of their palpi, flagella, mandibles, maxillae and spermathecae are identical with or closely match the illustrations and descriptions of these structures provided by Wirth and Castner (1990) and Clastrier and Wirth (1995).

These Hispaniolan females differ from the holotype of *F. tettigonoris* in being slightly larger (wing length 1.40 mm and 1.55 mm vs. 1.25 mm for the holotype), and their spermathecae appear more elongate, perhaps due to them being slightly longer as well (largest spermatheca 0.110 mm and 0.115 mm vs. 0.091 mm for the holotype). Unfortunately, we were not able to compare them directly with the holotype of *F. tettigonoris*, as efforts to locate it in the collection of the U. S. National Museum of Natural History (USNM) housed at the Smithsonian Institution's Museum Support Center

(MSC) in Suitland, MD, were unsuccessful. This is most likely due to further needs to curate material returned by Dr. Wirth to the MSC before his death.

Comparison with similar species. Another species of the *ixodoides* group that has been reported from the West Indies is *F. (M.) willistoni* Wirth (1971), found on phasmatids from Puerto Rico, Jamaica, and Brazil. Females of *F. willistoni* readily differ from those of *F. tettigonaris* in having uniformly dark brown legs and bicolored antennae.

Females of *F. (M.) brasiliana* are also very similar to those of *F. tettigonaris* because of their mandible with 15-17 teeth and a similarly shaped 3rd palpal segment, but unfortunately, no measurements or descriptions were provided for the wings or spermathecae. Females of *F. brasiliana* differ from those of *F. tettigonaris* by having more slender 4th and 5th palpal segments, the 4th palpal segment is truncated mesobasally (oblique basally in *F. tettigonaris*), the prementum is divided medially (entire in *F. tettigonaris*), and the maxilla is dark brown or black with about 18 teeth ("plaques" of Clastrier and Wirth 1995) that extend across the breadth of that structure (16 teeth that extend to midportion of maxilla in *F. tettigonaris*).

Material examined. Seven females, DOMINICAN REPUBLIC, Elias Piña Prov., Loma de Las Tayotas, Loma Nalga de Maco massif, ca. 790 m, 2 oct. 1996, D. E. Pérez-Gelabert, attached to dorsum of green juvenile male *Polyancistrus*. Four specimens deposited in the entomological collection of the Museo Nacional de Historia Natural, Santo Domingo (MNHN), and three deposited in the USNM. One female, DOMINICAN REPUBLIC, La Vega Prov., just before Los Tablones, Parque Nacional J. A. Bermúdez, 1,150 m, 4 Sept. 1997, D. E. Pérez-Gelabert, attached to dorsum of green juvenile male *Spelaeala bondi* (deposited in MNHN).

Comments. Szadziewski and Grogan (1994) reported that biting midges of the genus *Forcipomyia* were the most abundant fossil ceratopogonids (254 of 584 specimens, or 43.5%) found as inclusions in several collections of amber from the Dominican Republic. This suggests that these midges were common 15-20 mya (Iturralde-Vincent and MacPhee 1996), and were likely attracted to the amber-forming resin as it was secreted by its source tree, *Hymenaea protera* Poinar (1991). No specimens of the subgenus *Microhelea* were found among the Dominican amber ceratopogonids studied by Szadziewski and Grogan (1998). This can probably be explained by their relative rarity then, as well as today.

No ectoparasitic Diptera are mentioned in the works of Rehn (1936, 1943), where 5 of the 6 species of *Polyancistrus* and the 2 species of *Spelaeala* were originally described, based on his studies of 80 (1936) and 8 individuals (1943). These are the first cases of Diptera ectoparasites encountered among the more than 20 *Polyancistrus* collected by DEPG from different areas of the Dominican Republic. Examination of 33 Hispaniolan Pseudophyllinae (29 *Polyancistrus* and 4 *Spelaeala*) from the collection of the Carnegie Museum of Natural History (CMNH) failed to reveal any other *Forcipomyia* ectoparasites.

Species of *Polyancistrus* and *Spelaeala* are large katydids, more than 40 mm long and robust as adults, with strong armature and spiny bodies. Therefore, it is most likely that females of *F. tettigtonaris* are only occasional parasites of these katydids and are probably only able to parasitize juvenile individuals which have much softer integuments than adults.

ACKNOWLEDGMENTS

We thank Bienvenido Santana (Departamento de Vida Silvestre, Santo Domingo) and Santo Navarro (División de Entomología, MNHN, Santo Domingo), for their assistance with the collecting trips to Loma Nalga de Maco and Parque Nacional J. A. Bermúdez. Appreciation is extended to Brian Inouye (Costa Rica) for providing preliminary information on the identity of the midges. We also thank John Rawlins (CMNH) for the loan of the Hispaniolan Pseudophyllinae material and Hollis B. Williams (USNM) for her efforts to locate the holotype of *F. tettigtonaris*. We also thank Art Borkent, Ted Cohn, Wayne Mathis and David Nickle for their reviews of an earlier draft of the manuscript. Collections in Parque Nacional J. A. Bermúdez were made possible by a permit from the Dirección Nacional de Parques, Santo Domingo to DEPG.

LITERATURE CITED

- Clastrier, J. and W. W. Wirth. 1995. Revision des *Forcipomyia* du sous-genre *Microhelea* de la région neotropical parasites de phasmes (Diptera: Ceratopogonidae). Ann. Soc. Entomol. Fr. (N. S.) 31: 97-150.
- Debenham, M. L. 1987. The biting midge genus *Forcipomyia* (Diptera: Ceratopogonidae) in the Australasian region (exclusive of New Zealand). IV. The subgenera allied to *Forcipomyia* s.s., and *Lepidohelea*, and the interrelationships and biogeography of the subgenera of *Forcipomyia*. Inverteb. Taxon. 1: 631-684.
- Iturralde-Vincent, M. A. and R. D. E. MacPhee. 1996. Age and paleogeographical origin of Dominican amber. Science 273: 1850-1852.
- Poinar, G. O., Jr. 1991. *Hymenaea protera* sp. n. (Leguminosae, Caesalpinoidea) from Dominican amber has African affinities. Experientia 47: 1052-1082.
- Rehn, J. A. G. 1936. The Hispaniolan genus *Polyancistrus* (Orthoptera, Tettigoniidae, Pseudophyllinae). Proc. Acad. Nat. Sci. Phila. 64: 184-234.
- Rehn, J. A. G. . 1943. A new genus and two species of Hispaniolan Pseudophyllinae (Orthoptera: Tettigoniidae). Notulae Naturae No. 125: 1-14.
- Szadziewski, R. and W. L. Grogan, Jr. 1994. Biting midges from Dominican amber. I. A new fossil species of *Baodasymia* (Diptera: Ceratopogonidae). Proc. Entomol. Soc. Wash. 96: 219-229.
- Szadziewski, R. and W. L. Grogan, Jr. 1998. Biting midges from Dominican amber. IV. Species of the tribes Dasyheleini and Forcipomyiini (Diptera: Ceratopogonidae). Polskie Pismo Entomol. 67: 255-290.
- Wirth, W. W. 1971. A review of the "stick-ticks", Neotropical biting midges of the *Forcipomyia* subgenus *Microhelea* parasitic on walking stick insects (Diptera: Ceratopogonidae). Entomol. News 82: 229-245.
- Wirth, W. W. 1991. Notes and corrections on stick-ticks, Neotropical parasitic midges of the *Forcipomyia* subgenus *Microhelea* (Diptera: Ceratopogonidae). Fla. Entomol. 74: 122-128.
- Wirth, W. W. and J. L. Castner. 1990. New Neotropical species of "stick-tick" (Diptera: Ceratopogonidae) from katydids. Fla. Entomol. 73: 157-160.
- Wirth, W. W. and N. Marston. 1968. A method for mounting small insects on microscope slides in Canada balsam. Ann. Entomol. Soc. Am. 61: 783-784.